

(12) UK Patent Application (19) GB (11) 2 195 713 (13) A

(43) Application published 13 Apr 1988

(21) Application No 8623676

(22) Date of filing 2 Oct 1986

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(51) INT CL
F04B 15/02

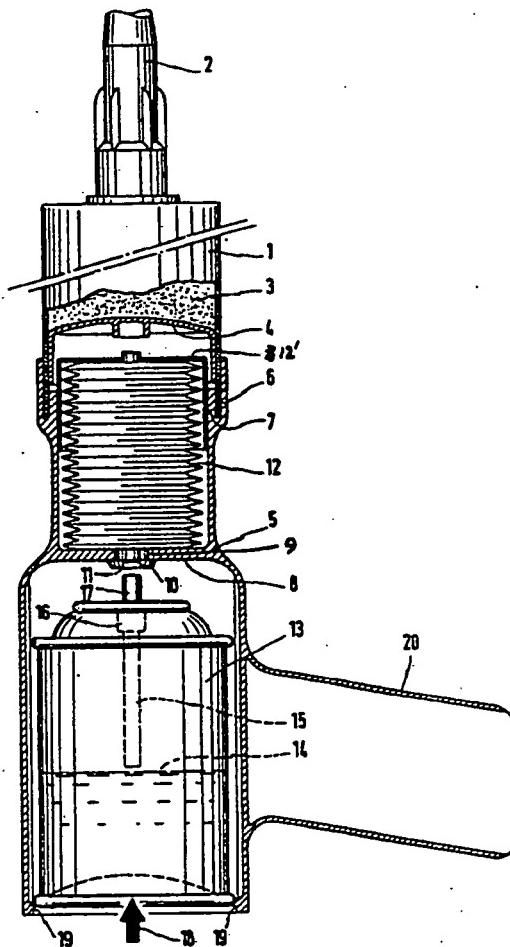
(52) Domestic classification (Edition J):
F1R 15A

(56) Documents cited
None

(58) Field of search
F1R
Selected US specifications from IPC sub-class F04B

(54) Apparatus for the discharge of
a pasty product

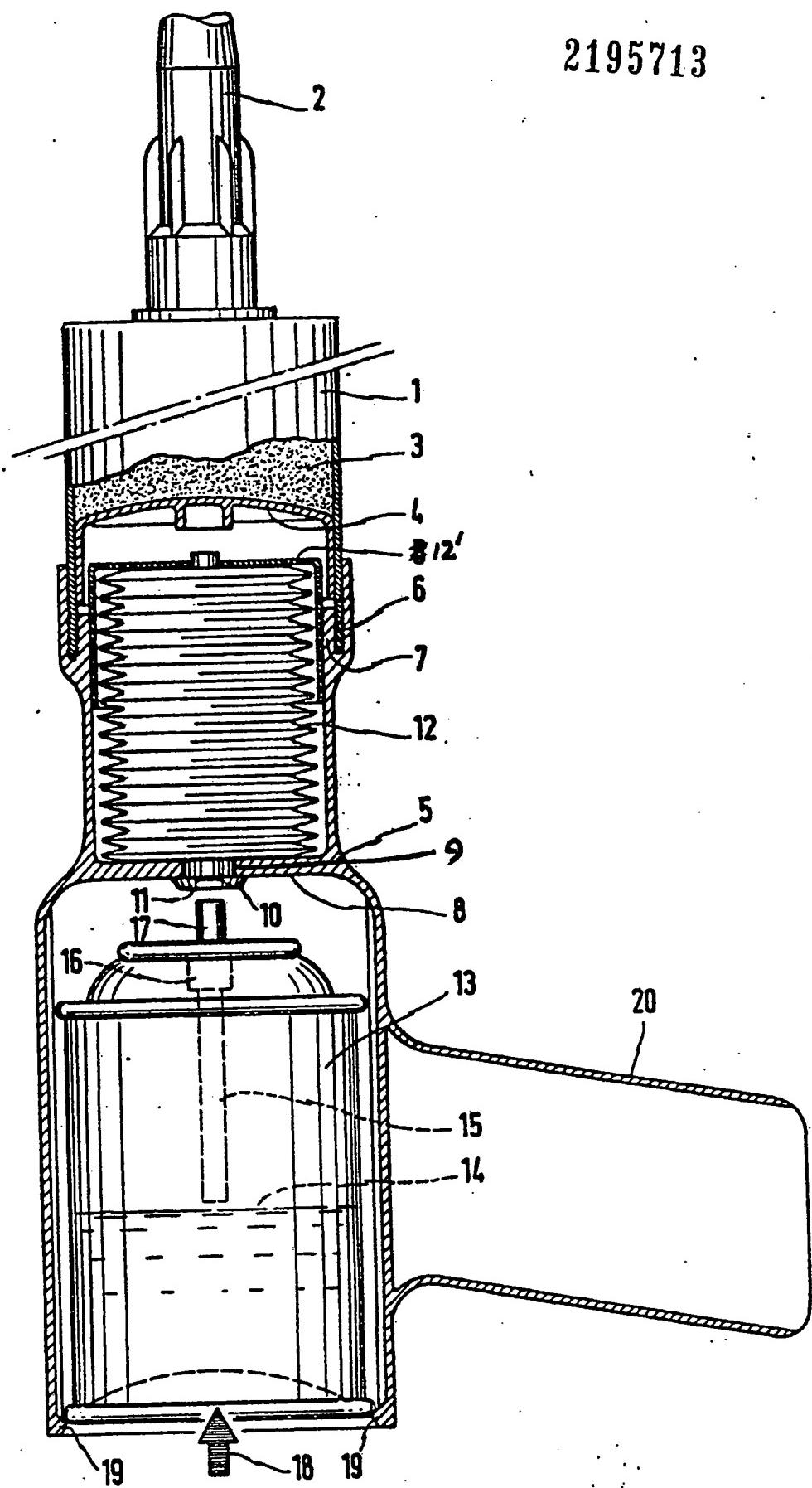
(57) The apparatus for the discharge of a pasty product 3 from cartridges 1 comprises a housing 5 having a mounting means 6 for the lower end of the cartridge 1 and a transverse wall 8 into which is fitted a plastics plug 10 having a bore 11, the plastics plug 10 being integral with a bellows 12 which is arranged on one side of the cartridge 1, and adjoining the transverse wall 8 is a chamber in which a propellant gas container 13 having a discharge flow tube 17 and a valve 16 which opens when an axial pressure is applied to the discharge flow tube 17 is axially displaceably disposed such that when pressure is applied to the bottom of the propellant gas container 13, the discharge flow tube 17 comes to bear sealingly against the plastics plug 10 and when the axial pressure is released the propellant gas container 13 moves back into its rest position, and at the same time the propellant gas pressure in the bellows 12 is reduced by way of the bore 11 so as to prevent an undesired subsequent discharge of product 3.



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SPECIFICATION**Apparatus for the discharge of a pasty product**

5 The invention relates to an apparatus for dispensing a paste or paste-like product from a cylindrical product container.

An apparatus for dispensing a paste-like product is disclosed in German laid-open application (DE-OS) No 29 49 368. The product container includes a bellows, a tubular mouth opening of which is pushed onto a nipple which is disposed centrally in a housing and is connected by way of a bore to the outlet side of a valve which is installed in the housing, the inlet side thereof being in communication with a propellant gas container. Although, in contrast to many other known apparatuses for the discharge of pasty products, that known apparatus has the advantage that it does not require a separate product discharge valve at the discharge opening of the product container, but the apparatus suffers from the disadvantage that it is not possible to use commercially available cartridges as the product container as it is necessary to use special containers with an incorporated bellows. Even if it is assumed that, in the known apparatus, the product container is releasably connected to the housing, problems are encountered in the replacement operation as it is not clear how the tubular mouth opening of the bellows can be pressure-tightly connected to the nipple while at the same time the product container can be connected to the housing in such a way as to be resistant to a pulling force. Another disadvantage is that a pressure-tight connection is also necessary between the propellant gas container and the housing and that both the valve and also a pressure reducing valve which may have to be disposed upstream thereof, for reasons of gas tightness, make it necessary to provide a series of close-tolerance bores and precision components which are to be fitted into the housing. Furthermore, an aspect which tells against practical use of the known apparatus is that discharge of the product is not concluded directly after closure of the valve, and product continues to be discharged through the discharge opening, as a result of the propellant gas pressure which still prevails at that time in the bellows, until the propellant gas pressure has dropped at least almost to atmospheric pressure. In that connection, the greater the extent to which the cartridge has already been emptied, the greater is the further amount of product which is discharged after closure of the valve. In addition, a rise in temperature can also cause product to be discharged when that is not desired, because in that situation the pressure of the propellant

moved from a cool storage area into a substantially warmer area or is exposed to sunlight.

US patent specification No 3 217 932 discloses an apparatus for the discharge of a pasty product, which has a cylindrical product container to which a discharge nozzle is connected, a separate valve being provided to prevent the undesirable phenomenon of further product being discharged after the intended time of termination of discharge. A holding means for the product container connects it to a housing which encloses a propellant gas container. The product container contains an ejection piston, behind which is disposed a chamber which is subjected to the action of propellant gas and the mouth opening of which is in the form of a plug fixed to the housing, the plug having a sealing seat which surrounds the discharge flow tube. The housing has an opening through which it is possible to gain access to the bottom of the propellant gas container which is provided with a valve. Disadvantages encountered with that apparatus, which is expensive in terms of structure, are the separate valve in the discharge nozzle, the necessary pressure-tight connection both between the product container and the housing and between the chamber which is subjected to the effect of compressed gas and the propellant gas container, and also the necessity for the ejection piston to be guided in the product container in such a way as to be sealed in respect of gas pressure, as well as the need for a separate vent valve in the piston.

According to the present invention there is provided apparatus for use in dispensing a paste or paste-like product from a cylindrical product container having at one end a discharge nozzle and incorporating an axially movable piston which acts on the product, comprising a housing, means for connecting the other end of the container to the housing, a bellows disposed in said housing for acting on said piston, a propellant gas container axially displaceably disposed in said housing with its bottom end accessible through an opening provided in the end of said housing, said gas container having a valve and a discharge tube, said housing being provided with a plug having a bore in communication with the interior of said bellows, said bore forming a conical seat for receiving the discharge end of the discharge tube when the gas container is displaced axially to open the valve by a force applied through said opening in the housing and for venting the bellows to ambient pressure when the force applied to the gas container is removed.

An embodiment of the invention has the advantage that it is possible to use inexpensive cartridges of the same outside diameter which

- ducts. The universally usable housing does not require any complicated matching operations and/or precision parts and can therefore be inexpensively made from plastics material.
- 5 Making the mouth of the bellows in the form of a sealing seat gives the advantage that no problems can arise in regard to making a seal between the propellant gas container and the housing and that in particular a closed-off
- 10 pressure chamber exists behind the product; only as long as the valve is held open by a pressure being applied to the bottom of the propellant gas container. That reliably avoids subsequent undesired discharge of product.
- 15 Preferably the housing has a tubular portion which forms a tubular extension of the cartridge when mounted thereon, and thus the housing is of a particularly simple configuration.
- 20 Preferably the means for connecting the container to the cartridge comprises an annular recess on the housing, said recess being provided on its inside with a screw thread or teeth, and this permits rapid exchange of the
- 25 cartridge, in particular if the annular recess which is proposed for that purpose is of a slightly conical or tapered configuration, in order in that way to compensate for tolerances in respect of wall thickness or gauge, as from
- 30 one individual cartridge to another.
- Preferably a siphon tube is connected to the valve in the interior of the propellant gas container, the siphon tube terminating in the centre point in respect of volume of the propellant gas container, the propellant gas container being half filled with liquid propellant gas; and this has the advantage of particularly economical consumption of propellant gas because, when the valve of the propellant gas
- 40 container is opened by a pressure being applied to the bottom thereof, propellant gas only ever passes into the bellows in the gaseous phase, more particularly, irrespective of the position of the apparatus, in relation to
- 45 space. In comparison, any propellant gas which passed into the bellows, in the liquid phase, would result in an excess of propellant gas which would escape unused after closure of the valve and therefore accompanying disengagement of the mouth of the bellows, which previously acts as a sealing seat.
- 50 Although the housing may be of such a configuration that the propellant gas container can be easily inserted and then prevented
- 55 from dropping out, for example by means of retaining projections, it can be removed again by deforming the retaining projections. In comparison therewith, the operation of replacing the propellant gas container (for example
- 60 also to replace it by a propellant gas container with a higher or a lower propellant gas pressure) is simpler if the housing comprises two

necting means is preferred.

An embodiment of the invention will now be described, by way of an example, with reference to the accompanying drawings, in which the single figure is a longitudinal section through an apparatus according to the present invention.

- A commercially available cartridge 1 having a nozzle 2 fitted onto the discharge opening thereof is filled with a pasty product 3 and contains an ejection piston 4. The other end of the cartridge 1 is releasably connected to a housing 5 which is preferably formed of a plastics material. For that purpose, the housing 5 has a mounting means in the form of an annular recess 6 formed between the outer casing portion of the housing and an annular shoulder 7 which is set back with respect thereto. In order to provide a connection
- 80 which is capable of resisting a pulling force thereon, at least one of the surfaces defining the annular gap is provided with a screw thread or with a screw thread-like tooth configuration which may be of a self-cutting kind.
- 85 While the commercially available cartridges 1 usually comprise a relatively soft plastics material, the housing 5 is made from a plastics material which is harder than the material of the cartridges 1, so that the screw thread or the tooth arrangement cuts into the casing of the cartridge 1. Making the annular recess 6 of a slightly conical or tapered cross-sectional configuration compensates for tolerances in respect of wall thickness or gauge of the cartridge 1 and thus further improves the resistance to a pulling force on the connection in an axial direction.
- The housing 5 has a transverse wall 8 with a hole 9 therein for preferably positively
- 105 mounting a plastics plug 10 provided at the lower end of a bellows 12, the length (height) of which is so selected that in the compressed condition, it has space in the hollow chamber formed between the transverse wall 8 and the piston 4. The bellows 12 can be subjected to the action of a compressed gas by way of a bore 11 provided in the plastics plug 10.
- 110 For that purpose, adjoining the transverse wall 8, the housing 5 has a downwardly or rearwardly open chamber in which a propellant gas container 13 is axially displaceably disposed. The propellant gas container 13 can be fitted into the chamber from below or one end and is prevented from falling out by retaining projections 19. "Frigen 12 A" has been found to be a particularly suitable propellant gas for the present purpose, at a pressure of around 5 bars at a temperature of 20°C. The diameter of the bellows 12 is chosen to suit that pressure. As the diameter of the bellows 12 is smaller than the inside dia-
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tion is received with an interference fit in the housing 5 and which, as the cartridge 1 is progressively emptied, prevents the expanding bellows 12 from deflecting and tilting sideways. The propellant gas container 13 is filled with the propellant gas 14 only to about the halfway point thereof. From the centre point thereof, in terms of its volume, a siphon tube 15 extends upwardly to a valve 16 to which a discharge flow tube 17 is connected. The valve 16 is of the usual kind which is known for example from spray cans and, when an axial pressure is applied to the discharge flow tube 17, opens against the force of a valve closing spring (not shown in the drawing). Accordingly, to provide for discharge of the pasty product 3, a pressure is applied in the direction indicated by the arrow 18 to the bottom of the propellant gas container 13 so that initially the discharge flow tube 17 comes to bear with its mouth opening against the conical enlargement of the bore 111 in the plug 10 so that the conical enlargement acts as a sealing surface. The valve 16 then opens so that propellant gas flows in the gaseous phase into the bellows 12 which accordingly drives the piston 4 forwardly.

In order to terminate the discharge of product from the nozzle 2, it is only necessary to relieve the pressure on the propellant gas container 13 which then returns to the illustrated position. The gas pressure in the interior of the bellows 12 then instantly falls, by way of the bore 11 in the plug 10. It is therefore not possible for any product to be urged out of the apparatus, after intended termination of the discharge flow.

The speed of discharge of the product depends on the discharge cross-section of the mouth of the nozzle 2, the viscosity of the product 3 and obviously the propellant gas pressure. The maximum propellant gas pressure is predetermined by the propellant gas 14 which is used to fill the propellant gas container 13. There are relatively few kinds of propellant gas available, which can be used for the present purpose. Such propellant gases are at considerably different pressures. If the speed of discharge of the product 3 is undesirably high, when using a given propellant gas and with a given product, then the speed of discharge can be reduced to the desired value by a suitable reduction in the diameter of the bellows 12.

For the sake of improved handling, the housing 5 is provided with a handle 20, similarly to a pistol grip.

60 CLAIMS

1. Apparatus for use in dispensing a paste or paste-like product from a cylindrical product container having at one end a discharge nozzle

ing, means for connecting the other end of the container to the housing, a bellows disposed in said housing for acting on said piston, a propellant gas container axially displaceably disposed in said housing with its bottom end accessible through an opening provided in the end of said housing, said gas container having a valve and a discharge tube, said housing being provided with a plug having a bore in communication with the interior of said bellows, said bore forming a conical seat for receiving the discharge end of the discharge tube when the gas container is displaced axially to open the valve by a force applied through said opening in the housing and for venting the bellows to ambient pressure when the force applied to the gas container is removed.

2. Apparatus as claimed in claim 1, in which the housing has a tubular portion which forms a tubular extension of the cartridge when mounted thereon.

3. Apparatus as claimed in claim 1 or claim 2, in which the means for connecting the container to the cartridge comprises an annular recess on the housing, said recess being provided on its inside with a screw thread or teeth.

4. Apparatus as claimed in any one of claims 1 to 3, in which a siphon-tube is connected to the valve in the interior of the propellant gas container, the siphon tube terminating in the centre point in respect of volume of the propellant gas container, the propellant gas container being half filled with liquid propellant gas.

5. Apparatus as claimed in any one of claims 1 to 4, in which the housing comprises two parts which are releasably connected together for the purpose of replacing the propellant gas container.

6. Apparatus for use in dispensing a paste or paste-like product from a cylindrical product container, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.